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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/727,032	11/30/2000	Sompong P. Olarig	1662-35000 (P98-2412)	2969

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EXAMINER

KING, JUSTIN

ART UNIT	PAPER NUMBER
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2181

DATE MAILED: 07/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/727,032

Applicant(s)

OLARIG, SOMPONG P.

Examiner

Justin I. King

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 June 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3. 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Specification***

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: A method and Apparatus arbitrating bus access according to each device's workload.

### ***Claim Objections***

2. Claim 5 is objected to because of the following informalities: Examiner recommends changing "compares the signal" in line 1 to "compare the signals" and "any bus devices" in line 2 to "any bus device". Appropriate correction is required.
3. Claims 13 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 13's limitation is as same as the claim 11's lines 8-10.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "*the workload*" in lines 5-6. There is insufficient antecedent basis for this limitation in the claim. Claims 2-10 are rejected because they incorporate claim 1's limitations.

Claim 4 recites the limitation "*the number*" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 7 recites the limitation "*the length*" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 11 recites the limitation "a signal" in lines 8-9. There is sufficient antecedent basis for this limitation in the claim's line 6. Claim 11 also recites the limitation "*the number*" in line 9. There is insufficient antecedent basis for this limitation in the claim. Claims 12-15 are rejected because they incorporate claim 11's limitations.

Claim 12 recites the limitation "a request" in line 2. There is insufficient antecedent basis for this limitation in the claim. Further clarification is needed if Applicant meant to differentiate claim 12's request from the claim 11's request signal or signal.

Claim 13 recites the limitation "a queue" in line 1. There is insufficient antecedent basis for this limitation in the claim.

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Claim 14 recites the limitation "a queue" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 16 recites the limitation "*the* workload" in line 4. There is insufficient antecedent basis for this limitation in the claim. Claims 17-20 are rejected because they incorporate claim 16's limitations.

Claim 18 recites the limitation "*the* number" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 20 recites the limitation "*the* act" in line 1. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-3, 10, 16-17, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Metz, Jr. et al. (U.S. Patent No. 5,448,701).

Referring to claim 1: Metz discloses a computer system comprising a computer bus coupling together a plurality of bus devices; a bus arbiter coupled to the computer bus, said bus arbiter receiving requests from said plurality of bus devices to obtain access to the computer bus; wherein said bus arbiter resolves conflicting requests from said bus devices based on the workload of the bus devices that request access to the computer bus (Metz's claim 10). Hence, claim 1 is anticipated by Metz.

Referring to claim 2: Claim 1's argument applies; furthermore, Metz discloses a first storage means for storing data to be transmitted (Metz's claim 10's preamble), which is the queue. Hence, claim 2 is anticipated by Metz.

Referring to claim 3: Claims 1-2's arguments apply; furthermore, Metz discloses that each of said plurality of bus devices asserts a signal to said bus arbiter when one or more operations are pending in the queue (column 1, lines 29-30, well-known prior art).

Referring to claim 10: Claims 1-3's arguments apply; furthermore, Metz discloses a "T" signal to indicate the predefined threshold been exceeded (column 4, lines 55-57).

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Such that Metz discloses asserting a signal to the arbiter indicating a range (threshold to full) of operations pending in the queue.

Referring to claim 16: Metz discloses a method of resolving conflicting bus access requests in a computer bus, comprising the acts of: determining if more than one bus device has requested access to the computer bus; determining the workload associated with each bus device requesting access to the computer bus; and granting access to the bus device that has the greatest workload (claim 1). Hence, claim 16 is anticipated by Metz.

Referring to claim 17: Claim 16's argument applies; furthermore, Metz discloses an method of arbitrating bus access; therefore, each of Metz's bus devices is capable of initiating cycles on the computer bus.

Referring to claim 20: Claim 16's argument applies; furthermore, Metz discloses that the bus arbiter breaks any ties between bus devices with an equal number of operations pending in the queue based on a predetermined priority value assigned to each bus device (column 4, lines 11-13).

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***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 4-6, 8-9, 11-15, and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Metz and Schroter (U.S. Patent No. 6,338,133).

Referring to claim 4: Metz's disclosure is stated above, although Metz discloses the signal indicates the fullness and the queue, Metz does not explicitly disclose that the single includes the number of pending operations. But Metz does disclose that it is known to arbitrate based on current workload of each queue (column 2, lines 48-50, the receiving queue's relative emptiness), and Metz discloses that prior art only focuses on the resource queue's status (column 1, Background Of The Invention's last paragraph), hence, Metz implicitly discloses that it is known to arbitrate based on the comparison on the source queues' workload.

Schroter discloses that it is known to monitor the number of the pending operations in each queue in workload balancing (figure 4A, column 9, lines 5-11).



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Although Schroter is focusing on the workload balancing for the processor's queue, Schroter's teaching is applicable in every workload-balancing scenario. Hence, it would have been obvious to one having ordinary skill in the computer art at the time Applicant made the invention to adapt Schroter's teaching to Metz because Schroter enables one to closely analyze workload by monitoring the number of each queue's pending operations.

Referring to claim 5: Claim 4's argument applies; furthermore, Metz discloses comparing each queue's status and awards access to the bus device with the most workload/pending operations (claim 10).

Referring to claim 6: Claims 4-5's arguments apply; furthermore, Metz discloses that the bus arbiter breaks any ties between bus devices with an equal number of operations pending in the queue based on a predetermined priority value assigned to each bus device (column 4, lines 11-13).

Referring to claim 8: Claims 4-5 claims' arguments apply; furthermore, Schroter's queue has 6 slots (figure 4A); therefore, in order to express from 0 to 6, Schroter's signal indicating the number of operations pending in the queue comprises a multi-bit signal.

Referring to claim 9: Claims 4-5 and 8's arguments apply; furthermore, the binary-base number is a standard practice in computer system.

Referring to claims 11 and 13: Metz discloses a computer system comprising a bus a plurality of bus devices, each of which couples to said bus, and each of which is capable of running cycles on said bus, and each of said bus devices includes a queue in which pending operations are stored while the bus device awaits access to the bus; a bus arbiter coupled to the bus, said bus arbiter receiving request signals from said plurality of

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bus devices that are seeking to run a cycle on said bus; wherein any of said devices that include one or more operations in its queue transmits a signal to said bus arbiter requesting access to said bus (claim 10).

Although Metz discloses the signal indicates the fullness and the queue, Metz does not explicitly disclose that the signal includes the number of pending operations. But Metz does disclose that it is known to arbitrate based on current workload of each queue (column 2, lines 48-50, the receiving queue's relative emptiness), and Metz discloses that prior art only focuses on the resource queue's status (column 1, Background Of The Invention's last paragraph), hence, Metz implicitly discloses that it is known to arbitrate based on the comparison on the source queues' workload.

Schroter discloses that it is known to monitor the number of the pending operations in each queue in workload balancing (figure 4A, column 9, lines 5-11). Although Schroter is focusing on the workload balancing for the processor's queue, Schroter's teaching is applicable in every workload-balancing scenario. Hence, it would have been obvious to one having ordinary skill in the computer art at the time Applicant made the invention to adapt Schroter's teaching to Metz because Schroter enables one to closely analyze workload by monitoring the number of each queue's pending operations.

Referring to claim 12: Claim 11's argument applies, Metz discloses that each of said plurality of bus devices is capable of running bus cycles on said bus, and wherein said signal requesting access to said bus is a request for ownership of said bus (claim 10).

Referring to claims 14-15: Claims 11 and 13's arguments apply; furthermore, the number of pending entries in each queue is an inherent nature of the system operation's

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characteristics. Therefore, the bus devices may have queues with same numbers of entries or different numbers of entries.

Referring to claim 18: Claim 18 is rejected as the claim 4's argument stated above.

Referring to claim 19: Metz discloses that each device has a queue for storing pending entries.

11. Claims 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Metz, Schroter, and "Operating System Concepts" by James L. Peterson and Abraham Silberschatz.

Referring to claim 7: Metz and Schroter's disclosures are stated above, but they do not explicitly disclose breaking any ties between bus devices with an equal number of operations pending in the queue based on the length of time since each device was last granted access to the computer bus. "Operating System Concepts", as a popular textbook, teaches that the "aging" is a known factor in resource arbitration (page 121, 3<sup>rd</sup> paragraph). Although "Operating System Concepts" is illustrating the "aging" factor in prioritizing the pending operation rather than a bus device, the "aging" concept is applicable in any arbitration among peer components or operations. Hence, it would have been obvious to one having ordinary skill in the computer art at the time Applicant made the invention to adapt Schroter, Peterson, and Silberschatz's teachings to Metz because Schroter enables one to closely analyze workload by monitoring the number of each queue's pending operations, Peterson and Silberschatz teach one to consider the "aging" factor in prioritizing and distributing system resources.

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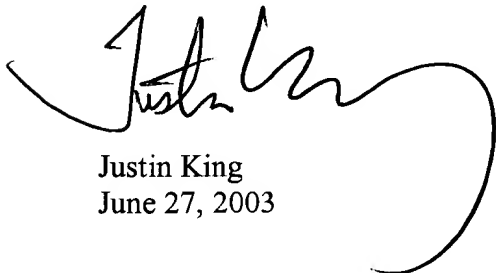
***Conclusion***

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin King whose telephone number is (703) 305-4571.


The examiner can normally be reached on Monday through Friday from 9:00 A.M. to 5:00 P.M..

If attempts to reach the examiner by telephones are unsuccessfully, the examiner's supervisor, Mark Reinhart can be reached at (703) 308-3110.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose number is (703)-306-5631.



Justin King  
June 27, 2003



**GOPAL C. RAY**  
**PRIMARY EXAMINER**  
**GROUP 2360**